

بِسْمِ اللَّهِ الرَّحْمَنِ الرَّحِيمِ





Containment of Hospital Associated Infection

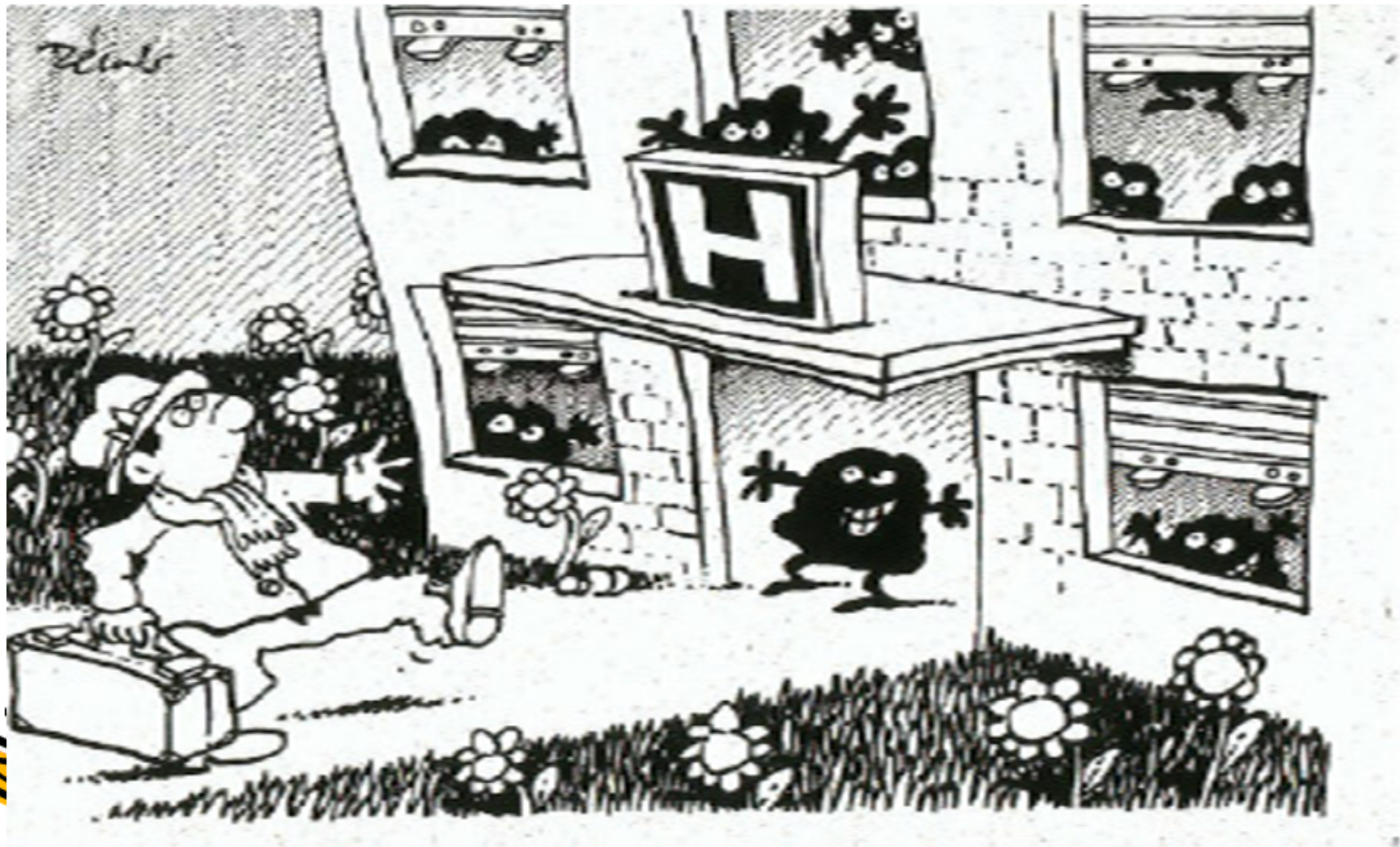
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Welcome to the hospital!
Bugs are waiting for you!!!



The Magnitude of the Problem

Healthcare-associated infections are *adverse patient events* that are known to affect the health and safety of approximately two million persons annually.





Definition of nosocomial infection

- Nosocomial” or “hospital acquired” infections are those which occur in hospitalized patients and which were not present or incubating at the time of admission .

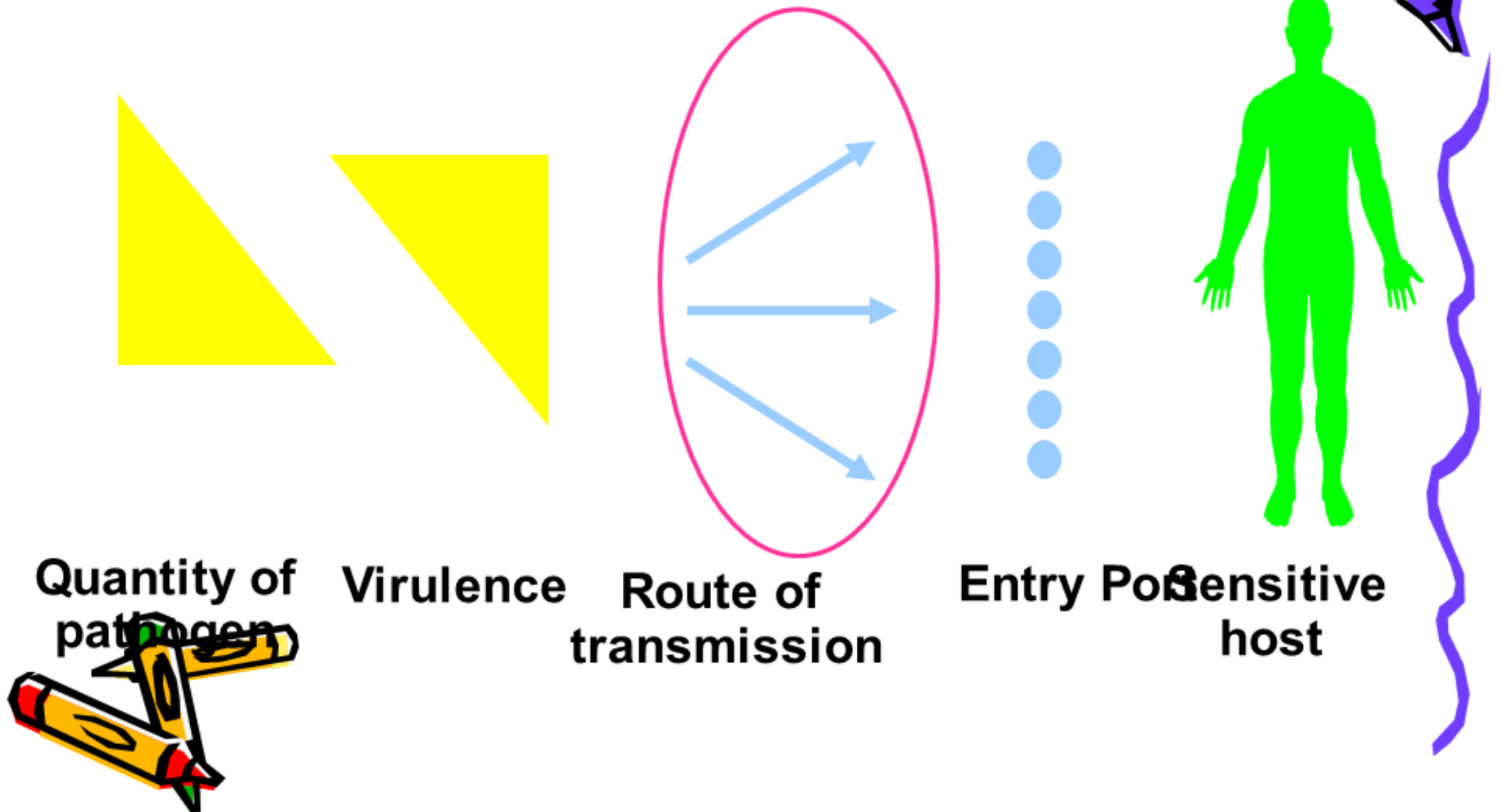


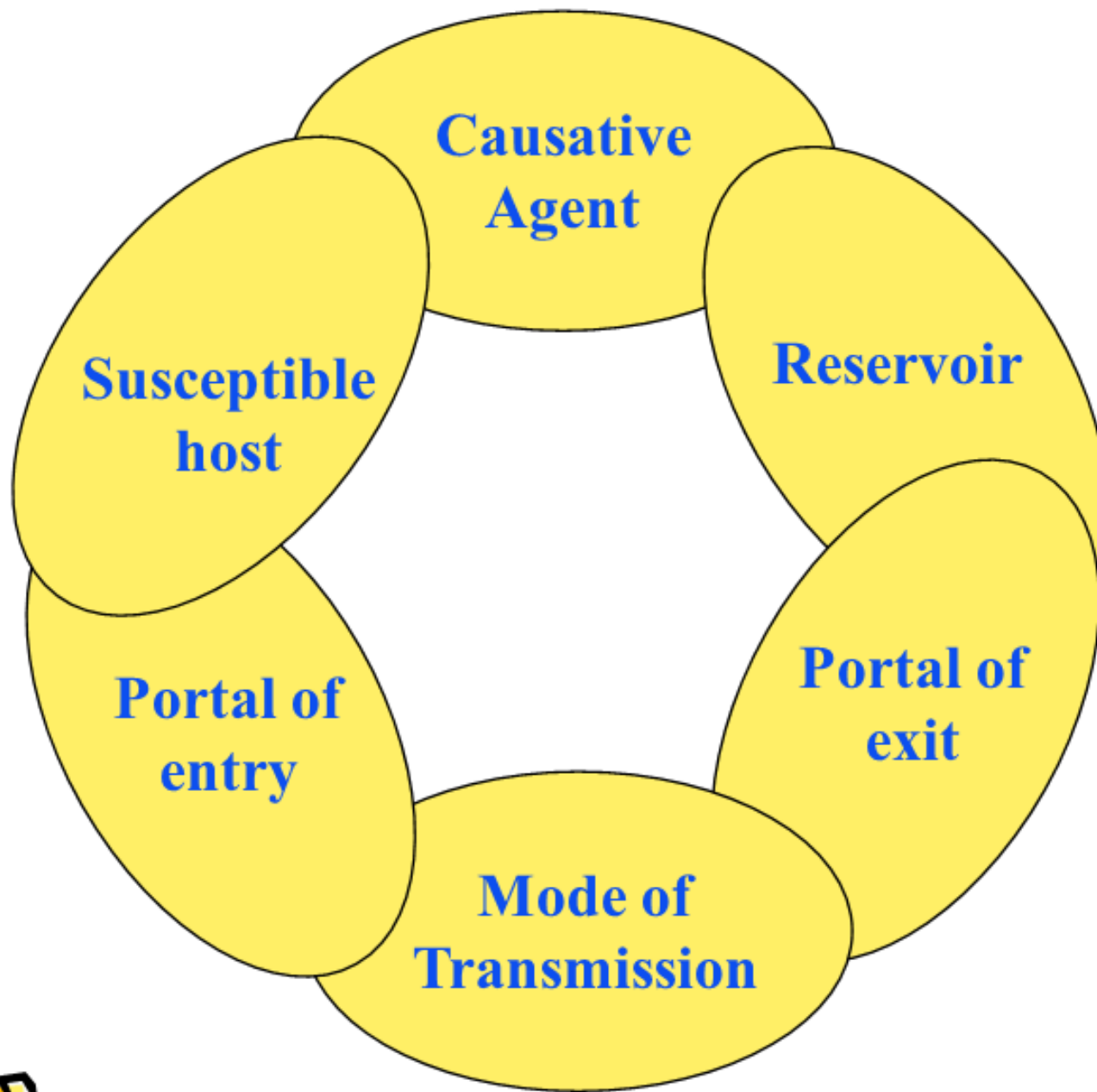
Nosocomial Infections

- Better called Healthcare Associated Infections (HAI)
- A localized or systemic conditions that result from adverse reaction to the presence of an infectious agent or its toxin
- Not present or incubating on admission to the hospital



Chain of Infection

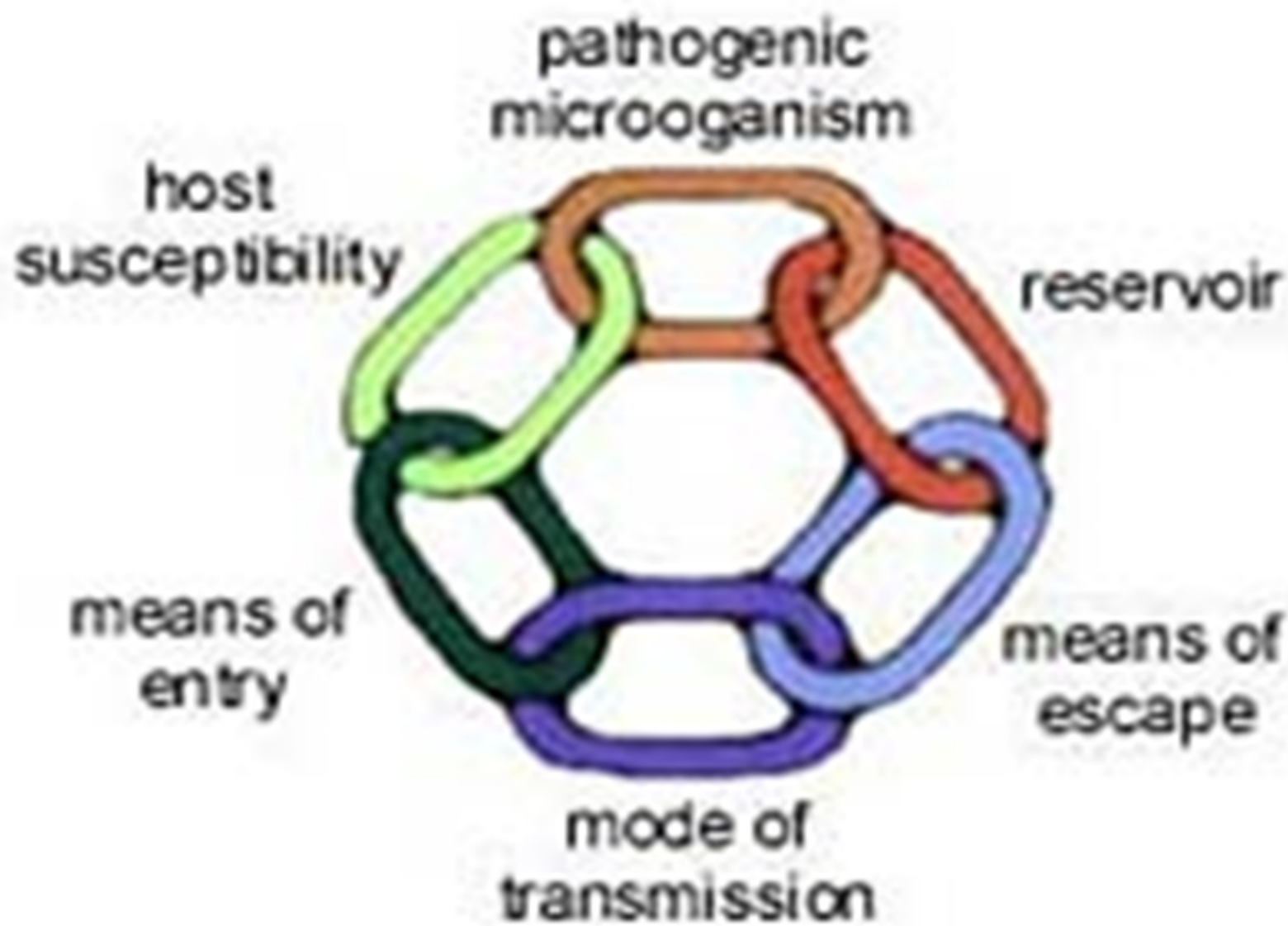





The Chain of Infection.

Components of the Infectious Disease Process.







There are many different **sources** of pathogens when in hospital

- Own normal flora (endogenous)
- Infected patients
- Traffic of staff and visitors
- Environment *e.g. fungi, Legionella*
- Blood products

Surgical instruments.



The sites of nosocomial infections

- Urinary tract(UTI).
- Surgical wounds (SSI).
- Respiratory tract (RTI).
- Skin (especially burns) -SST.
- Blood (bacteraemia) -BSI.
- Gastrointestinal tract. ***Clostridium difficile* Infection**



Central nervous system.



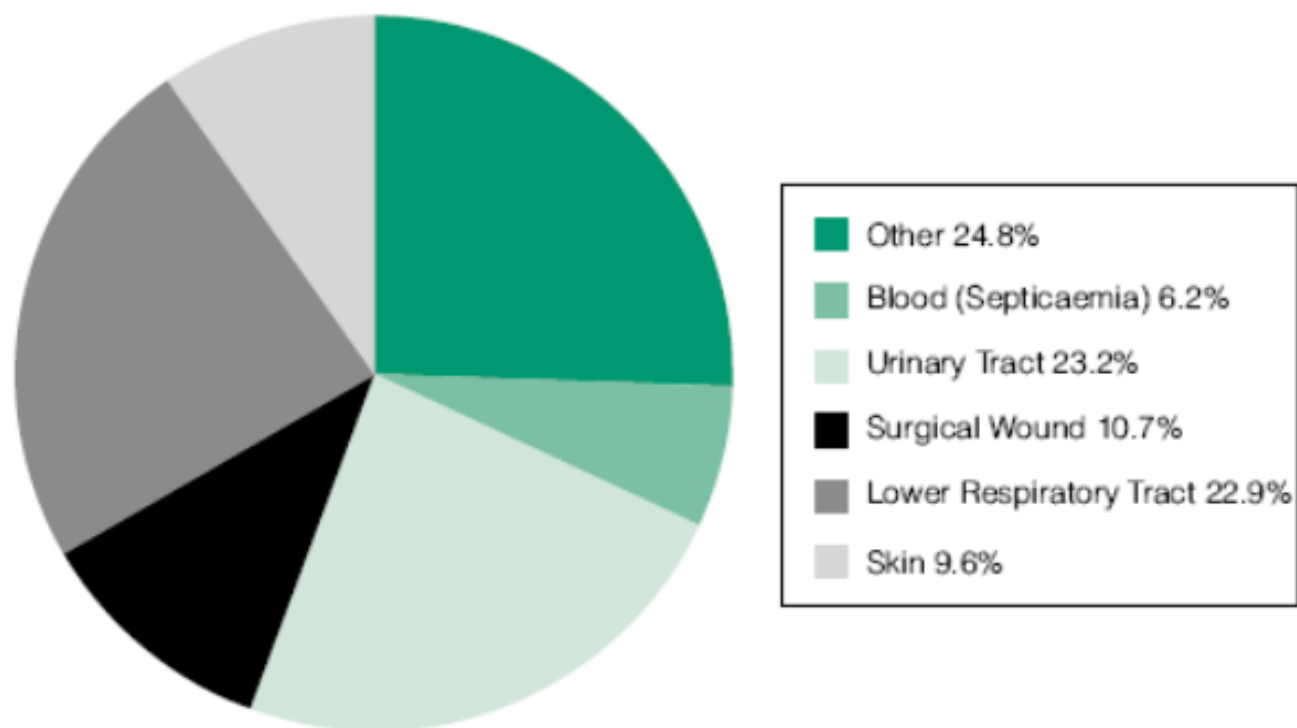


Around 9 per cent of patients have a hospital acquired infection at any one time

The main sites of hospital acquired infections

Figure 1

Urinary tract infections are the most common type of hospital acquired infection and blood stream infections have the highest associated mortality



Source: Second prevalence study Emmerson et al (1996)

Note: 37,111 patients from 15 centres were studied over a 15 month period from May 1993 to July 1994 in two month study periods and a mean hospital acquired infection prevalence rate of 9% (range 2-29%) was calculated.¹



A close-up photograph of a bouquet of white daisies with bright yellow centers. The flowers are densely packed and set against a solid dark blue background. The text 'Impact of nosocomial infection.' is overlaid in the center of the image.

Impact of nosocomial infection.

Impact of nosocomial infections

- *Increase morbidity & mortality.*
- *Coast effectiveness.*
- *Increase hospital stay.*
- *Emergence of resistant strains.*



Nosocomial infections are the result of three factors ;

- 1. High prevalence of pathogens .*
- 2. High prevalence of compromised hosts .*
- 3. Efficient mechanisms of transmission from patient to patient.*



MRSA

- Methicillin (Meticillin) Resistant *Staphylococcus aureus*
- *S.aureus* carried by 30% of us (nose/ skin)
- MRSA is no more virulent than MSSA strains but more difficult to treat
- Emerging Vancomycin resistance is a concern

• *The Biomedical Scientist Jan 2008 p39-41*



Rapid MRSA screening

- Current methods for screening for MRSA are based on culture and take 48 hours
- PCR-based screening can generate a result in 2 hours!
- *mecA* is carried on a transferable gene cassette called *SCCmec* – but also found in coagulase-negative staphylococci
- PCR developed using primers for *SCCmec* and *orfX* on the *S. aureus* chromosome



A close-up photograph of a plant with dark red, serrated leaves. The edges of the leaves are variegated with a bright yellow-green color, creating a striking contrast. The leaves are densely packed and overlap each other, filling the entire frame. The lighting is bright, highlighting the texture and colors of the foliage.

Routs of pathogen transmission



- Nosocomial infections can be transmitted by all modes of transmission that occur in the community.



- Contact.
- Droplet.
- Air borne.
- Vector borne (no significant role in nosocomial infection).



Contact transmission

Skin to skin.

Patient to patient .

Patient to staff.

Patient to contaminated equipment.



Diseases transmitted by contact

- MRSA.
- Multiresistant gram negative bacteria (*Pseudomonas* & *E.coli.*)
- Scabies.
- *C.difficile.*
- Gas gangrene.
- *Bacillus anthracis* (Anthrax) .



Droplet transmission

Droplets are generated from the source persons during:-

- Coughing.
- Sneezing.
- Talking.
- Performance of certain procedure
 - Suctioning.
 - Bronchoscope.
- The droplet size $>5 \mu\text{m}$ it involves contact with
 - Conjunctiva.
 - mm-of nose or mouth .



Droplet transmission

- Because the droplet do not remain suspended in air special air handling and ventilation are not required to prevent droplet transmission .



Diseases transmitted by Droplet

- Meningococcal meningitis.
- Influenza virus.
- Diphtheria.



Airborne transmission

- Air-borne droplet nuclei (5 μm) or smaller of evaporated droplet, that may remain suspended in the air for long periods.
- Air handling unit is required.
- Dust particles containing the infectious agents.



Disease transmitted by Air borne

- T.B.
- SARS.
- Chicken pox.
- Small pox.
- Measles



Standard precaution

- ❖ There precaution designed for the cause of all patients in hospital *regardless of their diagnosis (presumed infection status)*
- ❖ Standard precaution is the primary strategy for success of nosocomial infection control.



Bacteria carried by hands

- Transient microorganisms.
- Resident microorganism.



Transient microorganisms






- ❖ Not part of the normal flora .
- ❖ Represent recent contaminations .
- ❖ Survive only for a limited period of time.



Transient microorganisms;

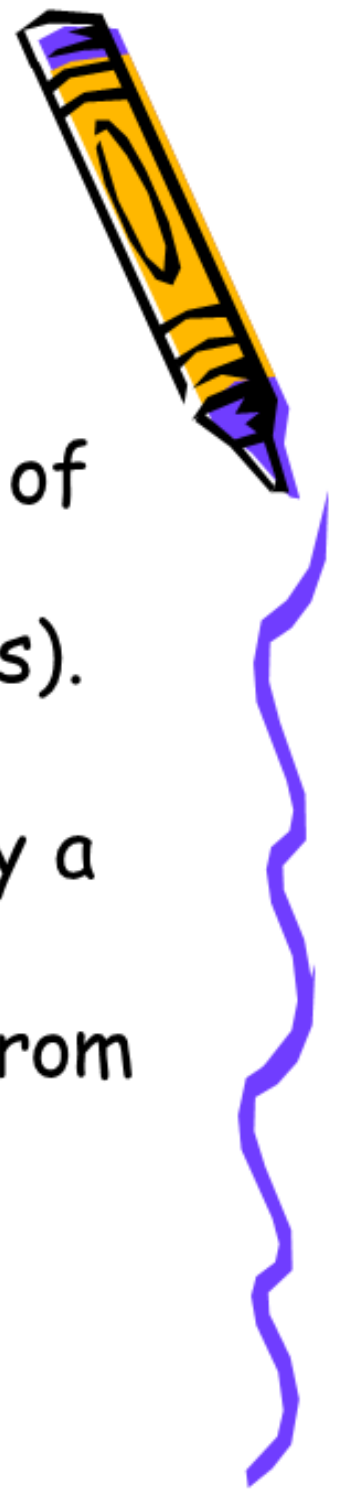
- They are acquired during contact with the infected colonized patient or the environment and are easily removed by a good hand washing technique.



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- The transient flora include most of the organism responsible for cross-infection e.g. gram negative bacilli(E.coli, klebsiella pseudomonas spp. ,and salmonella spp) Staph. aureus & viruses e.g Rota viruses.
- 

Resident flora

- These microorganisms are normal flora of the skin and include coagulase-negative Staphylococci (mainly staph. Epidermidis).
- They are usually deep seated in the epidermis and are not easily removed by a single hand washing procedure.
- They rarely cause infection apart from during implant surgery and at I.V site.



Occasions for hand washing

- Before & after pt. contact.
- Before & after gloving .
- After contact with pt. body fluids.
- After moving from contaminated body site to clean area.



Types of medical waste;

- Infectious waste.
- Sharp waste.
- Human part waste.
- Chemical waste.
- Cytotoxic waste.
- Pressurized containers.
- Radioactive waste.
- Pharmaceutical waste.



● تصنيف الألوان المعتمدة في النفايات

● Color Coding for Medical Waste Bags & Containers



النفايات العامة

Unregulated
Medical Waste



النفايات المعدية
Infectious Waste



النفايات الملوثة
بمواد سامة للخلايا

Cytotoxic Waste



SAFE HANDLING OF SHARP INSTRUMENTS

- needles,
- Scalpels,
- Broken glass or
- Other item that may cause a laceration or puncture.



SAFE HANDLING OF SHARP INSTRUMENTS

- ***Never recap.***
- ***Scoop method.***





Biological spill kit



Preventing nosocomial infections



Methods of prevention of nosocomial infection (and breaking the chain of transmission) include;

1. Observance of aseptic technique
2. Frequent hand washing especially between patients
3. Careful handling, cleaning, and disinfection of fomites.




4. Where possible use of single-use disposable items .

5. patient isolation .

6. Avoidance where possible of medical procedures that can lead with high probability to *nosocomial infection*.





7. Various institutional methods such as air filtration within the hospital.

8. General awareness that prevention of nosocomial infection requires constant personal surveillance.

9. Active oversight within the hospital.



- Control of infections is everyone's personal responsibility.

